Performing Configurational Analyses in Management Research: A Fuzzy Set Approach

Competitive paper submitted to the 30th IMP Conference 2014, Bordeaux

Alexander Leischnig, Stephan C. Henneberg, Sabrina C. Thornton

University of Bamberg
Queen Mary, University of London
University of Huddersfield

Abstract

This article introduces fuzzy set qualitative comparative analysis (fsQCA) as an innovative analytical approach to build causal theories in the area of management studies. Although fsQCA has received considerable attention in many disciplines, such as social and political sciences, its application in management research is still in its infancy. We show how fsQCA as a set-theoretical approach can be used to help improve our understanding of causal relationships between important aspects of management. This is done by providing a framework, which outlines the steps taken in a fuzzy set analysis in order to determine causal conditions, and more importantly configurations of such conditions, and how these contribute to relevant outcomes. In addition, this article illustrates fsQCA by providing an empirical example in the area of management studies, particularly sales growth strategy. The present research contributes to the extant literature by highlighting fsQCA as a novel approach to analyse complex causality, and by discussing options regarding how this approach can be used to complement findings from conventional causal data analysis procedures.

Keywords

Causal research, fuzzy set, fsQCA, qualitative comparative analysis, sales growth

INTRODUCTION

One of the most predominant and enduring notions emphasized in management research is that of causality, i.e. cause and effect mechanisms. This causal logic in research is mirrored in management practice by a focus on 'drivers' of certain outcomes. Analyses of causal relationships (as well as causal ambiguity) represent an important approach used to understand the linkages between strategic decisions, organizational structures, management activities, and business performance measures (e.g. King, 2007; Fiss, 2011). Manifold studies have examined causal relationships between different types of constructs, such as strategy implementation, customer retention, or firm financial performance (e.g. Bozec et al., 2009; Calantone et al., 2002). Although these studies have greatly contributed to our understanding of *linear causation* (and to a lesser extent of non-linear causation) and the 'net effects' between the constructs of interest, little is known about what is called *complex causation* and how it can be analysed (Ragin and Fiss, 2008). Complex causation is defined as a situation "*… in which an outcome may follow from several different combinations of causal conditions*" (Ragin, 2008a, pp. 23). Examination of complex causation mirrors managerial practice, which is usually based on making holistic decisions, which include trade-off considerations between several organizational aspects. Managerial decisions therefore are about whole 'recipes' and not just about 'single ingredients' (Meyer et al., 1993). Complex causation entails consideration of all theoretically possible configurations of causal conditions that may influence an outcome in question and represents a major methodological challenge (Davis et al., 2007; Ragin, 2008a; Wagemann and Schneider, 2010).

Previous studies indicate that the analysis of configurations plays a crucial role in organization theory and management research (Meyer et al., 1993; Doty and Glick 1994). Considerable parts of current organization and management research understand firms as complex systems that comprise interconnected structures and practices (Clegg et al., 1996; Fiss, 2007; 2011). Such configurational research is based on Gestalt-theory and involves a holistic approach in which a social entity takes its meaning from the interaction and interdependencies between its elements as a whole and cannot be understood in isolation (Short et al., 2008; Hult et al., 2006). However, conventional statistical methods used to test configuration theories and complex causality are often less proficient at handling such multi-faceted interdependencies. Configurations represent "nonlinear synergistic effects and high-order interactions" between a broad set of variables (Delery and Doty, 1996, p. 808). Frequently employed data analysis methods, such as regression analysis or structural equation modeling, are based on linear and symmetric relationships between constructs of interest. These constructs are treated as competing in explaining variance in the outcomes rather than concentrating on ways in which causal conditions may combine (to form configurations, or 'recipes') to contribute to desired outcomes (Greckhamer et al., 2008; Ragin, 2008a). Thus, the mismatch between management theory (Fiss, 2007) and the limitations of general linear methods (Greckhamer et al., 2008; Ragin, 2008a) underscore the need to explore further approaches that complement existing research methods and in turn may help management researchers analyse complex causation.

The overall purpose of this article is to introduce fuzzy set qualitative comparative analysis (fsQCA; Ragin 1987, 2000, 2008a) as a relatively novel data analysis approach to examine complex causality and by doing so improve management researchers' diagnostic toolkit. The contributions of this article to the literature are threefold. First, we outline the utility of fuzzy set approaches and provide a framework of how to run these analyses. Secondly, we provide the state of the art on management research using fsQCA by reviewing and summarising existing studies using fsQCA to analyse management issues and phenomena. Thirdly, we illustrate a fsQCA by performing an empirical analysis within the context of general management, particularly sales growth strategy. More specifically, we run a fsQCA to explore configurations of different firm orientations, firm characteristics and industry characteristics and their contributions to achieving sales growth. We then compare these fsQCA results to a traditional regression analysis and discuss the complementarity of traditional variable-based and set-theoretic methods.

FUNDAMENTALS AND APPLICATION OF FSQCA

Initially, we briefly discuss the key basics of fsQCA and outline important distinctions between set-theoretic methods, such as fsQCA, and general linear data analysis approaches, such as regression analysis and structural equation modeling. Table I summarises key characteristics of fsQCA and shows major differences between set-theoretic and linear data analysis methods.

Table I. Differences between set-theoretic and correlational methods

	Set-theoretic methods (e.g. fsQCA)	**Correlational methods (e.g. regression, SEM)**
Approach to explanation	Causes-to-effects approach: Explain cases by identifying configurations of causal conditions	Effects-to-causes approach: Estimate average effect of one (or more) independent constructs over all cases
Concept of causality	Analysis of complex causation: Examination of combinations of causal conditions	Analysis of linear causation: Examination of net effects of independent variables on dependent variables
Basic assumption	Equifinality: Several solutions can be equally effective in achieving a final effect state	Unifinality: One optimal model best represents the empirical data and explains the effects
Analytic approach	Boolean algebra	Linear arithmetics

Based on Mahoney and Goertz (2006) and complemented by Fiss (2007) and Ragin (2008).
Notes: SEM = structural equation modeling.

One of the major differences between fsQCA and conventional data analysis methods refers to the approach of explanation. Central to fsQCA is the so-called *causes-to-effects approach* (Mahoney and Goertz, 2006), which means that fsQCA describes cases as combinations of attributes (i.e. configurations of causal conditions) as well as the outcome in question (Fiss, 2007). For example, firms with superior market performance (outcome in question) may be characterised by a combination of excellent market knowledge, a clear management strategy, and effective strategy implementation (configuration of causal conditions). FsQCA thus focuses on whether or not a case shows specific attributes or combinations of these attributes and the outcome in question. In contrast, standard linear methods pursue an effects-to-causes approach (Mahoney and Goertz, 2006), which means that the primary objective is to estimate the average effect of one (or more) variables in a set of cases. For instance, a researcher might be interested in exploring the effect of strategy implementation on firms' market performance across a sample of cases. Linear methods thus primarily focus on detecting and analysing the 'net-effect' that one (or more) independent variable has on a dependent variable by estimating one optimal model that fits with the empirical data.

To do so, variable-oriented standard linear methods require at least medium to large-N samples. FsQCA as a case-oriented research approach was originally designed for, and is still mostly applied with, small- or medium-N samples. However, prior research indicates that set-theoretic approaches are well suited to analyse large-N empirical data, as this is often the situation in management research (Rihoux, 2006; Woodside et al., 2012).

Because fsQCA considers configurations of causal conditions, it represents a valuable analytic tool to examine situations of *complex causality*. FsQCA takes into account that outcomes of interest seldom have a single cause (multi-causality), that causes rarely operate independent from each other (interdependence), and that a specific cause may have different (i.e., positive and negative) effects depending on context (asymmetry) (Greckhamer et al., 2008; Leischnig et al., 2013; Rihoux, 2006). Thus, fsQCA is particularly useful for examining *equifinality* (Fiss, 2007, 2011), that is, situations in which "a system can reach the same final state from different initial conditions and by a variety of different paths" (Katz and Kahn, 1978, pp. 30). Equifinal solutions are generally understood as alternative pathways to achieve an outcome of interest, they are referred to as different 'recipes of success'. They are treated as logically equivalent and thus substitutable (Ragin, 2008a). Identification of equifinal solutions for specific issues has evolved as an important area of management studies (e.g. Marlin et al., 2007; Payne, 2006), because it provides firms with a variety of optional design choices for a desired outcome, thus fostering the potential for efficiency gains (Fiss, 2011).

In order to examine which combinations of attributes lead to the outcome in question, fsQCA, relies on *Boolean algebra rather than linear arithmetics*. FsQCA builds upon the premise that relationships among different variables are best understood in terms of set membership (Fiss, 2007). Conventional methods of QCA, such as crisp sets, define membership in sets using binary values (1 = membership, and 0 = non-membership), that is, a specific case either shows or does not show a particular causal condition. With fsQCA, however, membership in sets is not restricted to binary values of 1 and 0, but may instead be defined using membership scores ranging from ordinal up to continuous values (Ragin, 2008a). A fuzzy set can be viewed as *"a continuous variable that has been purposefully calibrated to indicate degree of membership in a well-defined and specified set"* (Ragin, 2008a, pp. 30). Therefore, fsQCA allows researchers to specify their constructs not only in kind, but also with regard to the degree to which certain attributes are present (Fiss, 2007). In order to assess set relationships with fsQCA, both causal conditions as well as the outcome in question are represented in terms of fuzzy set membership scores. The primary objective is to explain cases that show desired values for the outcome in question by describing the degree to which causal conditions or combinations of these conditions are present. Thus, fsQCA explores how the membership of cases in causal conditions is linked to membership in the outcome (Ragin, 2008a). These set relationships are interpreted in terms of necessity and/or sufficiency. A causal condition is defined as necessary if it must be present for an outcome to occur, and as sufficient if by itself it can produce a certain outcome (Ragin, 1987, 2000, 2008a).

Although fsQCA has been widely employed in other disciplines such as political and social sciences, its use in the management studies is still in its infancy. Table II provides an overview of empirical studies published in academic journals using fsQCA since 2000 (i.e. since the fs/QCA software program has become available). In sum, this review includes 23 studies. The majority of these studies use fsQCA within the setting of Strategy, Organization, and International Business research. More specifically, the majority of the studies focus on macro-level analyses that involve examinations of country- and industry-related management phenomena. Other areas of management studies, such as HRM, production, supply chain management, or marketing, have not yet embraced this method to the same extent. This is noteworthy, as there exist communities of research practice that are using multiple case studies routinely (for which a systematic small-N comparison technique such as fsQCA is useful), for example business relationships and business network studies within the Industrial Network Approach (INA) (e.g. Abrahamsen et al., 2012). However, as yet only limited cross-fertilization has happened in these research areas when it comes to set-theoretic analysis approaches.

In summary, the literature review reveals that although there exist some articles, which introduce the fsQCA approach to different sub-disciplines of management, such as organization studies (Fiss, 2011; Greckhamer et al., 2008), or to management studies in general (Leischnig et al., 2013; Öz, 2004; Woodside et al., 2012), its use is currently restricted to (only) a few areas of management studies and focused on a limited number of potential outlets.

Table II. Overview over empirical management studies including fsQCA

Source	Management studies area	Topic	Study characteristics
Kitchener et al. (2002)	Public Management	Present QCA as a viable method for public management research; example of barriers to policy diffusion	fsQCA 5 case studies
Kogut et al. (2004)	Strategy	Identification of prototypes of strategic practices with superior performance	fsQCA 70 survey responses
Öz (2004)	Management Studies; Research Methods	Using fuzzy set analysis for comparative case research in management; example of industry competitiveness	fsQCA 10 industry cases
Kent (2005)	Marketing	Juxtaposition of variable-centered approaches with combinatorial/fuzzy logic approaches; exemplification via attitudes towards spam and permissions by loyalty card holders	fsQCA 1053 survey responses
Kent and Argouslidis (2005)	Marketing	Service elimination decisions (UK), comparison of case-based QCA approach with variable-centred regression approach	fsQCA 112 survey responses
Häge (2007)	Research Methods; International Business	Comparison of fuzzy set analysis with constructivist approaches; example of communications in WTO negotiations	fsQCA re-analysis (data not reported)
Kvist (2007)	International Business	Using fuzzy set analyses to understand ideal types; example of comparative welfare research on ideal unemployment policy types	fsQCA 7 country cases
Skaaning (2007)	International Business	Level of respect in post-communist contries; comparison of csQCA and fsQCA with regression analysis	cs/fsQCA 28 country cases
Vis et al. (2007)	International Business	Excellence in country economic performance; comparison of a fuzzy-set analysis with a factor analysis	fsQCA 19 country cases
Grandori and Furnari (2008)	Organization	Developing organizational design by specifying formulas of organization; derivation of testable propositions	fsQCA 75 survey responses
Greckhamer et al. (2008)	Strategy	Present QCA as viable method for strategic management research; exemplification for studying business unit performance	fsQCA 2841 survey responses
Pajunen (2008)	International Business	Influence of country membership in institutions on foreign direct investment by multinational enterprises	fsQCA 47 country cases
Ordanini and Maglio (2009)	Marketing	Successful new service development process configurations	fsQCA 39 survey responses
Schneider et al. (2010)	International Business	Interplay of national institutional configurations and institutional capital	fsQCA 19 country cases
Fiss (2011)	Management Studies	Core and periphery in configurations (Miles and Snow) as exemplifications of causal processes	fsQCA 205 survey responses
Greckhamer (2011)	Organization; International Business	Compensation levels and equality in different cultural settings	fsQCA 44 country cases
Woodside et al. (2011)	International Business	Effect of cultural recipes on international experiential behaviour (consumption behaviour)	fsQCA 14 country cases (based on 3651 survey responses)
Crilly et al. (2012)	Management Studies	Configurational analysis of firms' response to institutional pressures for CSR	fsQCA 17 firm cases
Woodside et al. (2012)	Management Studies	Ethnography-based theory and use of QCA as an alternative variable-based analytical approaches	fsQCA re-analysis (data not reported)
Ganter and Hecker (2013)	Organization	Analysis of configurational paths to organizational innovation	fsQCA 2995 survey responses
Leischnig et al. (2013)	Management Studies	Configurational analysis of technology transfer success	fsQCA 66 survey responses
Meuer (2013)	Management Studies	Analysis of archetypes of inter-firm relations in the implementation of management innovation	fsQCA 56 firm partnerships

FRAMEWORK FOR CONDUCTING FSQCA

Based on the research presented above and recommendations by Ragin (1987, 2000, 2008a), we suggest a multiple-step approach to perform fsQCA. This approach involves five stages including (1) modeling of causal configurations and potential outcome effects, (2) calibration of causal conditions and the outcome in question, (3) construction and refinement of the truth table, (4) analysis of the truth table, and (5) evaluation and interpretation of results. In the next subsections, we describe each of these steps in more detail.

MODELING OF CAUSAL CONFIGURATIONS AND POTENTIAL OUTCOME EFFECTS

The most pivotal part of a fsQCA is the development of the model, which includes specification of causal conditions and the outcome in question. As with other causal approaches, such as structural equation modeling, fsQCA does not prove causality itself; this is merely posited based on theoretical reasoning as part of the modeling step. FsQCA seeks to identify the causal conditions underlying an outcome by investigating the attributes of cases exhibiting that outcome (Greckhamer et al., 2008; Ragin, 2000, 2008a). Note that fsQCA refers to a single outcome (e.g. 'superior product innovation compared to industry'); if several outcomes are relevant, separate fsQCAs need to be performed. Both specifications of relevant causal conditions as well as selection of cases (i.e. the empirical data) are important issues in this first stage of a fsQCA (Greckhamer et al., 2008). Theory and previous empirical research may guide researchers identifying relevant causal conditions and developing hypotheses about how these causal conditions contribute to the outcome in question. Central to fsQCA is the analysis of all logically possible combinations of causal conditions, which can be calculated by the formula 2^k where k denotes the number of causal conditions considered. As this formula indicates, even a relatively small number of causal conditions (e.g. 6) may lead to a high number of logically possible combinations (e.g., $2^6 = 64$). However, empirical observations almost never represent all of these logically possible configurations. Thus, limited diversity may become a relevant issue (Ragin, 2008b), which occurs because *"the potential variety is limited by the attributes' tendency to fall into coherent patterns"* (Meyer et al., 1993, p. 1176). To overcome this issue, researchers should deliberately select, those causal conditions relevant to an outcome in question. The selection of the causal conditions to be examined should be guided by theory and researchers' knowledge of the topic as well as by managerial relevance.

CALIBRATION OF CAUSAL CONDITIONS AND THE OUTCOME IN QUESTION

After relevant causal conditions and the outcome in question have been specified, a key stage of fsQCA is the generation of well-constructed fuzzy sets, which raises the issue of calibration. Calibration refers to transforming construct measures into fuzzy set membership scores. In several scientific disciplines, researchers calibrate their measurement instruments and the readings these instruments generate by adjusting them so that they match or conform to known standards (Fiss, 2011; Ragin, 2008a). In management studies the external criteria that are used to calibrate measures and transform them into fuzzy set membership scores may reflect standards based on substantive, i.e. theoretical and extant empirical knowledge (Ragin, 2008a). This knowledge specifies what constitutes full membership, full non-membership, and the cross-over point (Ragin, 2000). Full membership (i.e. value 1) and full non-membership (i.e. value 0) represent qualitative states. The continuum between these two states reflects varying degrees of membership in a fuzzy set ranging from 'more out' (i.e. values closer to 0) to 'more in' (i.e. values closer to 1) (Ragin, 2000, 2008a). The cross-over point (i.e. value 0.5) reflects the degree of most ambiguity with regard to fuzzy set membership.

To calibrate measures and translate them into fuzzy set membership scores, researchers may employ an indirect or a direct method (Ragin, 2008a). The indirect method relies on the researcher's allocating of cases into groups according to their degree of membership in the target set (Ragin, 2000). Using the indirect method of calibration, the researcher initially groups cases with different levels of membership, assigns these different levels of preliminary membership scores, and then refines these membership scores using the observed measures (Ragin, 2000). In contrast to the indirect approach, the direct method uses three qualitative anchors to structure calibration: the threshold for full membership, the threshold for full non-membership, and the cross-over point (Ragin, 2000). The basic notion underlying this calibration technique is that it rescales a construct using the cross-over point as an anchor from which deviation scores are calculated based on the values of full membership and full non-membership (e.g. Fiss, 2011; Ragin, 2008a). Based on substantive knowledge the researcher selects the three thresholds and measures are translated into fuzzy set membership scores using the metrics of log odds. Calibration of measures using the direct method can be conducted by means of the fs/QCA software program (Ragin et al., 2007), which includes commands to automatically run this transformation of variables.

CONSTRUCTION AND REFINEMENT OF THE TRUTH TABLE

Once measures of the causal conditions and the outcome in question have been transformed into fuzzy set membership scores, the so-called truth table needs to be constructed and prepared for subsequent analysis. The truth table is a data matrix that consists of 2^k rows, where k denotes the number of causal conditions selected. Each row of the truth table displays a specific combination of causal conditions as well as the number of cases high on these conditions (i.e. with fuzzy set membership scores greater 0.5). The full truth table lists all possible combinations of causal conditions with some rows showing many, some only a few, and some no empirical cases (Fiss, 2011). To perform a fuzzy set analysis, the truth table needs preliminary refinement based on two criteria: frequency and consistency (Ragin, 2008a). Frequency indicates the extent to which the combinations of causal conditions as expressed in the rows of the truth table are empirically represented. The definition of a frequency cut-off ensures that the assessment of the fuzzy subset relations occurs only for those configurations exceeding a specific minimum number of cases. Low-frequency configurations are designated as logical remainders since their empirical evidence is considered not substantial enough. Previous research using fsQCA does not suggest fixed threshold values for frequency. However, researchers need to take into account the overall number of cases in the data set. While in small- (e.g. 10 cases) and medium-sized (e.g. 50 cases) samples frequency thresholds of 1 or 2 are appropriate, for large-scale samples (e.g. > 200 cases) frequency cut-offs should be set higher.

Consistency assesses to the degree to which the cases sharing a given causal condition or combinations of causal conditions agree in exhibiting the outcome in question (Fiss, 2011; Ragin, 2006). Thus, consistency refers to the extent to which cases correspond to the set relationships expressed in a solution (Fiss, 2011). Consistency is calculated by dividing the number of cases sharing a given combination of causal conditions and the outcome from the number of cases that exhibit the same combination but do not show the outcome. Previous research recommends that the minimum acceptable consistency level should be set at 0.80 (Ragin, 2008a). Based on the aforementioned conditions, the initial truth table is prepared for further analysis.

ANALYSIS OF THE TRUTH TABLE AND EXAMINATION OF (COMBINATIONS) OF CAUSAL CONDITIONS FOR AN OUTCOME TO OCCUR

In the fourth step, the truth table is examined. FsQCA investigates complex causal relationships based on set-subset relationships and using the Quine-McCluskey algorithm which allows logical reduction of complex configurations of causal conditions into a reduced number of configurations that lead to the outcome in question (Fiss, 2011; Ragin, 2008a). The algorithm identifies configurations of conditions that consistently lead to an outcome by stripping away those causal conditions that are sometimes present and sometimes absent, thus indicating that these factors are not essential parts of a sufficient configuration for the outcome in question (Fiss, 2011). As previously mentioned, limited diversity (i.e. a situation where not all logically possible configurations are represented by empirical manifestations) is an important issue to consider in fsQCA. To address this issue, the algorithm conducts a counterfactual analysis of causal conditions (Fiss, 2011; Ragin, 2008a). Counterfactual analysis takes into account the absent combinations of causal conditions and treats them as logical remainders. By so doing, it offers a pathway to overcome the issue of limited diversity and helps researchers deal with deficiency of empirical manifestations (Fiss, 2011). Analysis of the truth table can be performed with the fs/QCA software program (Ragin et al., 2007), which includes commands to run the analysis and examine configurations of causal conditions that contribute to the outcome of interest.

EVALUATION AND INTERPRETATION OF RESULTS

The final step when performing a fsQCA refers to the evaluation and interpretation of the results. The fsQCA reports three types of solutions: a complex, a parsimonious, and an intermediate solution. Each of these solutions displays configurations of causal conditions leading to the outcome in question. However, the three types of solutions differ to the extent in which logical remainders have been considered in the counterfactual analysis (Ragin, 2008b). The complex solution does not consider any logical remainder. It thus produces the most complicated result and plays a minor role when it comes to interpretation of findings (Fiss, 2011). The parsimonious solution considers any logical remainder that will help generate a logically simpler solution. Therefore, the parsimonious solution produces the most concise result. Finally, the intermediate solution considers those logical remainders that represent ‘easy counterfactuals’. The distinction between ‘easy’ and ‘difficult’ counterfactuals is based on information regarding the connection between each causal condition and the outcome (Ragin, 2008a): While ‘easy’ counterfactuals refer to situations in which a redundant causal condition is added to a combination of causal conditions that by themselves already lead to the outcome in question, ‘difficult’ counterfactuals relate to situations in which a causal condition is eliminated from a configuration leading to the outcome in question, based upon the premise that this causal condition is redundant (Fiss, 2011). The intermediate solution disregards fewer causal conditions than the parsimonious solution but more causal conditions than the complex solution. The intermediate solution thus reports results that represent a compromise between inclusions of no or any logical reminder in the counterfactual analysis.

To interpret the results from a fsQCA, researchers should focus on both the parsimonious and the intermediate solutions. Inspection of both solutions may help researchers detect core and peripheral causal conditions that contribute to the outcome in question. As Fiss (2011, p. 403) points out, “… core conditions are those that are part of both parsimonious and intermediate solutions, and peripheral conditions are those that are eliminated in the parsimonious solution and thus only appear in the intermediate solution”. Thus, inspection of the parsimonious and intermediate solutions allows researchers to draw conclusions regarding the causal essentiality of specific combinations of causal conditions (Fiss, 2011).

In order to assess the relative importance of configurations of causal conditions for an outcome, researchers should inspect coverage values. Coverage indicates the percentage of cases that take a given pathway to the outcome in question (Fiss, 2011; Ragin, 2000, 2008a). The fsQCA reports two coverage scores—the raw coverage and the unique coverage— to assess the empirical importance of the solutions. Raw coverage refers to the size of the overlap between the size of the causal combination set and the outcome set relative to the size of the outcome set; unique coverage controls for overlapping explanations by partitioning the raw coverage (Ragin 2008). By inspecting the coverage scores for the particular solutions, researcher can assess the extent to which a solution 'explains' the outcome.

EMPIRICAL ILLUSTRATION OF FSQCA

An important objective of this article is to introduce fsQCA by performing an illustrative analysis. We outline an fsQCA using individual-level data within the setting of general management and strategy research. By doing so, we not only illustrate the necessary steps to be taken, but also demonstrate that fsQCA is an appropriate diagnostic tool to examine micro-level management issues using a large-N empirical basis (Fiss et al., 2013). We will structure our analysis according to the steps outlined previously.

The first step of a fuzzy set analysis concerns the *modeling of causal configurations and potential outcome effects*. In our analysis we explore which combinations of strategic orientations of the firm (i.e. customer orientation, competitor orientation, and relationship orientation), firm characteristics (i.e. firm size, and market presence), and industry characteristics (i.e. industry growth) contribute to sales growth of the focal company. Thus, this analysis examines not how individual variables drive sales growth but how the interplay of six causal conditions contributes to the outcome in question. By so doing, we offer insights into the causal pattern underlying strategic, operational, and environmental factors to generate sales growth. The selection of the constructs that are presumed to be relevant in the context of this study was guided by both theory and previous empirical research. First, organization theory suggests that firm-internal strategic orientations interact with characteristics of the firms and the environment (Short et al., 2008). Secondly, business relationship and marketing orientation research suggests that a strategic orientation towards different stakeholders in the embedded business network represent important antecedents of sustainable competitive advantage (Achrol and Kotler, 1999). Research on market orientation has identified customer orientation as well as competitor orientation as pivotal concepts in this context (Narver et al., 2004; Jaworski and Kohli, 1993; Narver and Slater, 1990). Customer orientation refers to firms' tendency to continuously create superior value for their customers based on an appropriate understanding of customers' business needs, while competitor orientation is defined as firms' tendency to continuously seek to sense competitive actions and respond to them timely and appropriately (Narver and Slater, 1990).

Furthermore, these two focal firm-centred strategic orientations need to be matched by building relationships based on collaboration and coordination with key stakeholders (Gulati et al., 2000; Morgan and Hunt, 1994; Palmatier et al., 2008). Such an orientation goes beyond just being internally oriented by responding appropriately to environmental changes (Morgan and Hunt, 1994; Palmatier et al., 2008). The resulting relationship orientation is defined as firms' tendency to coordinate and collaborate with its counterparts based on mutual goals (Walter et al., 2006). Additionally, characteristics of the firm and the business environment impact on a firm's orientation and the degree to which a firm's orientation may translate into sales growth. For the purpose of this research, we selected firm size and market presence as relevant firm characteristics, and industry growth as a critical environmental factor.

The primary question underlying this study is: What combinations of firm strategic orientations contribute to sales growth given diverse firm characteristics and environmental conditions? To detect and analyse these configurations, we conducted an empirical survey with a sample of managers from multiple industries and analyse the data using fsQCA. The sampling frame consisted of 3,500 managers from a proprietary international database. Data were collected through a web-based survey, using the Qualtrics software. An invitation was initially sent to all 3,500 potential respondents in November 2012 by e-mail, followed by three reminders at one-week intervals (i.e. four-wave data collection). A total number of 789 complete responses were recorded, resulting in a response rate of 23%. However, to ensure the quality of the dataset, we further eliminated 186 responses completed in less than 15 minutes. The threshold of 15 minutes was decided as the cut-off point of a 'valid' response based on a pre-test which showed that faster results indicated 'pattern responses' (Fricker et al., 2005). After eliminating further 7 responses with missing values, the final data set consisted of 596 responses from a variety of industry sectors (i.e. services: 45.1%; manufacturing: 30.7%; public sector: 3.8%; others: 20.4%, mostly consisting of agricultural, mining, and construction). In terms of firm size, the three largest groups by number of employees were ≥ 5001 (32.7%), 51-250 (15.4%), and 751-2500 (14.9%). The majority of the respondents were at a position of either middle to higher management (67.1%) or top-level directors (15.3%) in their organizations. In addition, 40.2% of the respondents have 6-10 years of managerial experience, followed by 3-5 years (31.6%), and 11-15 (12.3%) years.

We controlled for non-response bias through two analyses suggested by Armstrong and Overton (1977). First, we compared the responses collected in the first (early respondents) and fourth waves (late respondents) of the data collection. A series of χ^2-tests were performed between these two groups regarding the used constructs and variables. The results showed that there exist no significant differences. Secondly, we compared observed values such as industry sectors, hierarchy levels, and work experience, with known values for the population via χ^2-tests. Non-significant Pearson's χ^2-values indicated that the survey respondents represent the population. Therefore, we conclude that non-response bias is not a concern for our subsequent analyses.

We tested common method bias by performing Harman's single factor test using exploratory (EFA) and confirmatory factor analysis (CFA) (Malhotra et al., 2006). In the EFA approach, common method bias is assumed to exist if a single factor emerges from the unrotated factor solutions or if the first factor explains the majority of the variance in the variables (Podsakoff and Organ 1986). The results of the EFA revealed that this is not the case in this study. The CFA approach relies on comparing the postulated multi-factor measurement model with a single-factor model in which all indicators load on a single factor, using a χ^2-difference test. Here, the results indicated that the hypothesized measurement model fits the data significantly better than the single-factor model ($\Delta\chi^2 = 1471.68$; $\Delta df = 4$, $p < 0.001$). Based on the results of these tests, common method bias does not constitute a problem for this study.

The second step of the fsQCA refers to the transformation of construct measures into fuzzy set membership scores by *calibrating causal conditions and the outcome in question*. In this study, we used two types of construct measures: single-item measures and reflective multiple-item measures. The single-item measures captured firm size, market presence, and industry growth. For all other constructs, we used reflective multiple-item measures. We measured firms' customer orientation and competitor orientation using four items for each construct based on previous scales by Narver and Slater (1990). To capture relationship orientation, we adapted four items from Walter et al. (2006), covering the extent to which a firm coordinates and matches its own activities with that of business partners. We captured sales growth using two items based on prior research by Venkatraman (1989). All multi-item constructs were presented on 7-point Likert-type rating scales ranging from 1 = "completely disagree" to 7 = "completely agree", unless otherwise stated. We measured firm size based on the number of full-time employees using a scale from 1 = "1-10 employees" to 8 = "more than 5000 employees." Industry growth is measured by asking respondents about the overall growth of their industry, using scale from 1 = "poor" to 7 = "excellent." Market presence is measured by the number of years a firm has been established.

We assessed reliability and validity of our measurement instrument by submitting all multiple-item reflective construct measures to a CFA. Table III details information on the construct measures of this study. The results indicated satisfactory levels of composite reliability and average variance extracted for the construct measures as they exceeded the commonly used thresholds of 0.6 and 0.5, respectively (Bagozzi and Yi, 1988). Furthermore, the results showed that Cronbach's alpha values exceeded the recommended cutoff value of 0.7 for all constructs (Nunnally, 1978). In addition, all factor loadings were high and significant at the 0.001 level, which indicated satisfactory convergent validity (Bagozzi et al., 1991). Pertaining to the overall model-fit, the indices revealed satisfying representation of the empirical data (χ^2 = 297.69, df = 101, χ^2/df = 2.95; comparative fit index [CFI] = 0.96; Tucker Lewis index [TLI] = 0.95; root mean squared error of approximation [RMSEA] = 0.06). In sum, these results allow us to conclude that the measurement model fits the data well. We assessed discriminant validity by evaluating as to whether the average variances extracted for any given two factors was greater than the squared correlation between the two factors (Fornell and Larcker, 1981). As Table IV reveals, the results indicated satisfactory discriminant validity.

Table III. Information on construct measures

Construct measures	*Factor loadings*
Customer orientation (α=0.89, CR=0.90, AVE=0.69)	
We closely monitor our level of commitment in serving customers' needs.	0.79
Our business strategies are driven by our goal to create greater value for our customers.	0.91
Our strategy for competitive advantage is based on our understanding of customer needs.	0.86
Our business objectives are driven primarily by customer satisfaction.	0.74
Competitor orientation (α=0.86, CR=0.86, AVE=0.60)	
Our salespeople regularly share information within our business concerning competitors' strategies.	0.77
We rapidly respond to competitive actions that threaten us.	0.80
Top management regularly discusses competitors' strategies.	0.81
We target customers where we have an opportunity for competitive advantage.	0.72
Relationship orientation (α=0.86, CR=0.86, AVE=0.61)	
We analyse what we would like to achieve with different business partners.	0.83
We match the use of resources (e.g. know-how, information, people and assets) to the individual relationship.	0.78
We inform ourselves of our business partners' goals, potentials and strategies.	0.78
We judge in advance which possible business partners to talk to about building up relationships.	0.72
Sales growth (α=0.90, CR=0.90, AVE=0.82)	
Sales growth position relative to your major competition	0.93
Market share gains relative to your major competition	0.88
Firm size	
Number of employees	1
Market presence	
Number of years established	1
Industry growth	
Overall growth of industry	1

Notes: α=Cronbach's alpha; CR=composite reliability; AVE=average variance extracted.

Table IV. Discriminant validity

	M	*SD*	*1*	*2*	*3*	*4*	*5*	*6*	*7*
Customer orientation	5.67	1.16	**0.69**						
Competitor orientation	5.07	1.27	0.47	**0.60**					
Relationship orientation	5.10	1.18	0.41	0.45	**0.61**				
Sales growth	4.57	1.30	0.08	0.15	0.06	**0.82**			
Firm size	5.78	2.04	0.00	0.00	0.00	0.00	–		
Market presence	24.26	16.81	0.00	0.00	0.00	0.00	0.20	–	
Industry growth	5.12	1.29	0.05	0.06	0.03	0.12	0.01	0.00	–

Notes: M=mean; SD=Standard deviation; AVE in bold on the diagonal; squared correlations between constructs below the diagonal.

Having established the measurement model, we transformed all construct measures into fuzzy set membership scores using the direct method of calibration. Table V displays the threshold values used for calibrating full membership, full non-membership, and the cross-over point. We calculated average scores for each of the multiple-item constructs. Then, we employed the fs/QCA software program (Ragin et al., 2007) and used the calibrate command to convert all construct measures into fuzzy set membership scores.[1]

Table V. Calibration rules

Causal condition	*Min*	*Max*	*Full membership*	*Full non-membership*	*Cross-over point*
Customer orientation	1	7	7	1	4
Competitor orientation	1	7	7	1	4
Relationship orientation	1	7	7	1	4
Sales growth	1	7	7	1	4
Firm size	1	8	6 (i.e., if no. of employees ≥ 750)	2 (i.e., if no. of employees ≤ 25)	4
Market presence	1	52	25 (i.e., if market presence ≥ 25 years)	5 (i.e., if market presence ≤ 5 years)	15
Industry growth	1	7	7	1	4

The third step of the fsQCA relates to the *construction and preparation of the truth table*. Within this study, the truth table contains 64 (i.e. 2^6) rows reflecting all logically possible combinations of causal conditions (i.e., combinations of strategic orientations, firm characteristics, and the industry factor). Of the 64 rows, 45 were represented by the empirical data, which points to limited diversity as typically present even in large-N studies. We prepared the truth table for further analysis by eliminating those rows that did not meet thresholds for frequency and consistency. Because of the large-scale empirical basis of this study, we set the frequency threshold at 5, which means that every combination of causal conditions should be represented by at least 5 empirical cases (choosing a cut-off threshold represents a trade-off decision between analysis granularity on the one hand, and interpretability on the other). By so doing, we eliminated 31 rows from the truth table. The truth table used in the analysis thus contained 14 rows covering 88% of the 596 empirical cases. The remaining rows were treated as logical remainders in the analysis as outlined above. Finally, we set the minimum acceptable level of consistency at 0.9 which means that the proportion of cases showing a specific combination of causal conditions and the outcome in relation to the same combination of causal conditions not exhibiting the outcome should be at least 90%. This conservative threshold implies a relatively high level of consistency required for solutions.

The fourth step of the fsQCA encompasses the *analysis of the refined truth table*. To do so, we used the truth table algorithm as implemented in the fs/QCA software program. We specified sales growth as the outcome of interest and firms' strategic orientations, firms' characteristics, and the industry factor as the causal conditions to predict this outcome. We then run the analysis to identify how the causal conditions combine to form configurations for achieving sales growth.

The final step of the fsQCA involves *evaluation and interpretation of the results*. We summarize the results from the fsQCA on sales growth in Table 6, using an adapted version of the notation of Ragin and Fiss (2008): Full circles indicate the presence of a causal condition; empty circles indicate its absence; boxes refer to subordinate conditions, which may be either present or absent and thus play a minor role. Finally, large circles indicate core conditions, and small circles indicate peripheral conditions.

Table VI. Configurations for achieving sales growth

	Solutions			
Causal conditions	*1*	*2*	*3*	*4*
Firm orientations				
Customer orientation	●	●	●	○
Competitor orientation	●	□	□	○
Relationship orientation	●	●	□	○
Firm characteristics				
Firm size	●	●	●	□
Market presence	□	●	●	●
Industry characteristics				
Industry growth	□	□	●	●
Raw coverage	0.84	0.74	0.62	0.20
Unique coverage	0.12	0.01	0.03	0.01
Consistency	0.99	0.99	0.99	0.92
Overall solution coverage	0.92			
Overall solution consistency	0.98			

Notes: ● = presence of a core condition; ● = presence of a peripheral condition; ○ = absence of a core condition; ○ = absence of a peripheral condition; □ = subordinate condition.

As can be seen in Table VI, the results of the fsQCA reveal four solutions (i.e. configurations of causal conditions leading to sales growth). In addition, the results of the fsQCA indicate both core and peripheral conditions. The existence of multiple solutions sufficient for the development of sales growth points to equifinality (Fiss, 2011). Solution 1 reveals a combination of causal conditions including the presence of all three firm orientations and the presence of firm size. In this configuration, firm size represents a core condition and the remaining factors are peripheral conditions. Market presence and industry growth play a subordinate role in solution 1. Solution 2 shows a combination of causal conditions involving the presence of two firm orientations (i.e. customer orientation and relationship orientation) and the presence of two firm characteristics (i.e. firm size and market presence). Again, firm size is a core condition. Competitor orientation and industry growth are subordinate conditions having a minor role for achieving sales growth. Solution 3 combines customer orientation with firm size and market presence, as well as industry growth. Of these causal conditions, firm size is a core factor, and competitor orientation and relationship orientation are subordinate conditions. Finally, solution 4 reveals a configuration containing the presence of market presence and industry growth and the absence of all three firm orientations. In solution 4, the absence of competitor and relationship orientation are core factors. In addition, this configuration shows that firm size plays a minor role as expressed through the box symbol. Regarding the coverage values, the fsQCA reveals an overall solution coverage score of 0.92 which means that the four configurations of causal conditions 'explain' 92% of sales growth. Focusing on the coverage scores for the particular solutions, an inspection of Table VI shows that solution 1 achieves the greatest score (i.e. 0.84) and solution 4 the smallest value (i.e. 0.20). These results indicate that sales growth can be achieved even without any of the three strategic orientations being developed. However, the existence of well-defined strategic orientations in combination with firm size has a considerably greater empirical relevance in terms of generating sales growth as indicated by higher coverage scores for the respective solutions.

POST HOC ANALYSIS

To further substantiate the findings and to compare the results from the fsQCA with conventional analytical approaches, we also run a regression analysis and examined the net effects of firms' strategic orientations, firm characteristics, and the industry factor on sales growth. Table VII illustrates the results from the regression analysis. The results reveal significant support for only two of the six independent variables. More specifically, the results from the regression analysis show a significant positive effect for competitor orientation on sales growth ($\beta = 0.25$; $p < 0.001$) and a significant positive effect for industry growth on sales growth ($\beta = 0.28$; $p < 0.001$). Thus, when analysing the net effects of six particular antecedent conditions of sales growth, the findings from a regression analysis reveal two significant net effects.

Table VII. Regression analysis of antecedents of sales growth

Relationships	*Expected sign*	*Beta*	*t-Value*	*Significance*
Customer orientation → sales growth	+	0.04	0.80	n.s.
Competitor orientation → sales growth	+	0.25	4.89	***
Relationship orientation → sales growth	+	0.00	0.00	n.s.
Firm size → sales growth	+	–0.05	–1.28	n.s.
Market presence → sales growth	+	0.06	1.36	n.s.
Industry growth → sales growth	+	0.28	7.13	***

Notes: *** = p<.001; n.s. = not significant.

A comparison of results from the fsQCA and the regression analysis shows different but complementary results. The overall positive net effects of competitor orientation and industry growth resulting from the regression findings are not mirrored with the same clarity in the fsQCA analysis. In fact, competitor orientation appears to be the least relevant condition in solutions where firm orientations are important (i.e. solutions 1-3), and is actually shown to be harmful in solution 4 (as this solution indicates that the absence of a competitor orientation is core for achieving sales growth). Thus, fsQCA provides a finer-grained understanding of the ambiguous effects of competitor orientation (which may point to an explanation for the fact that existing research on market orientation sometimes shows positive performance results as a consequence of market orientation, sometimes neutral, and sometimes negative results) (Grewal and Tanshuhaj, 2001; Cadogan et al., 2009). Industry growth is less prominent in the fsQCA, it shows no relevance for the two solutions with the highest coverage, while it is identified as the most important net driver in the regression analysis.

SUMMARY AND DISCUSSION

The primary objective of this article was to introduce fsQCA as a novel analytic approach to examine management problems characterised by complex causality. In this article, we present key differences between set-theoretic and general correlational methods and show that fsQCA represents a useful diagnostic tool that overcomes limitations of conventional statistical methods. In addition, we show that although fsQCA has been repeatedly employed in disciplines such as political and social sciences, its use in management studies is still in its infancy and primarily restricted to macro-level issues. In this article, we suggest a multiple step approach to conduct a fsQCA. This approach involves five stages and is illustrated in an exemplary analysis with the setting of general management. As the exemplary analysis reveals, fsQCA is especially useful in situations, in which an outcome may follow from several different combinations of causal conditions (Ragin, 2008a): the regression analysis does not provide the same detailed understanding of different 'recipes for success' as does fsQCA. Therefore, fsQCA provides valuable insights into the nature of causal patterns and complements findings of conventional statistical procedures such as regression analysis. Our results illustrate this regarding the conditions of sales growth, which are assumed to include some strategic firm orientations (regarding customers, competitors, and relationships) and firm characteristics (such as firm size and market presence) and environmental factors (such as industry growth). Complex causality allows for an understanding of the importance of the interplay of these conditions and, for example, clearly indicates the importance of firm size as a core condition which, together with especially customer orientation as a peripheral condition effects sales growth. Contrariwise the regression analysis only points to the overall importance of competitor orientation and industry growth for achieving sales growth.

However, rather than being a competing research approach, fsQCA should be understood as a complementary method of analysis that supplements findings from general correlation-based approaches. The additional insights obtained through fsQCA contribute to a richer and more profound understanding of management phenomena and provide managers with more accurate diagnostics, especially in research areas where complex causality is likely. Based on equifinal solutions, managers now have choices between different 'recipes' and can make decisions about which of these successful recipes fits best with their firm's capabilities and strategic outlook. This article encourages researchers to examine further such issues of multi-causality and equifinality inherent in many management issues by means of fsQCA.

NOTES

[1] Because cases with fuzzy set memberships scores of precisely 0.5 (i.e. the cross-over point) cause difficulties when intersecting fuzzy sets, Ragin (2008) recommends avoiding the use of a precise 0.5 fuzzy set membership score for causal conditions. To address this issue, we added a constant of 0.001 to all causal conditions with fuzzy set membership scores smaller 1 (Fiss, 2011).

REFERENCES

Abrahamsen, M. H., Henneberg, S. C. and Naudé, P. (2012). 'Using actors' perceptions of network roles and positions to understand network dynamics'. *Industrial Marketing Management*, **41**, 259–69.

Achrol, R. S. and Kotler, P. (1999). 'Marketing in the network economy'. *Journal of Marketing*, **63**, 146–63.

Armstrong, J. S. and Overton, T. S. (1977). 'Estimating nonresponse bias in mail surveys'. *Journal of Marketing Research,* **14**, 396–402.

Bagozzi, R. P. and Yi, Y. (1988). 'On the evaluation of structural equation models'. *Journal of the Academy of Marketing Science*, **16**, 74–94.

Bagozzi, R. P., Yi, Y. and Phillips, L. W. (1991). 'Assessing construct validity in organizational research'. *Administrative Science Quarterly*, **36**, 421–58.

Bozec, R., Dia, M. and Bozec Y. (2009). 'Governance–performance relationship: A re-examination using technical efficiency measures'. *British Journal of Management*, **21**, 684–700.

Cadogan, J. W., Kuivalainen, O. and Sundquist, S. (2009). 'Export market-oriented behavior and export performance: Quadratic and moderating effects under differing degrees of market dynamism and internationalization'. *Journal of International Marketing*, **17,** 71-89.

Calantone, R., S. T. Cavusgil and Y. Zhao (2002). 'Learning orientation, firm innovation capability, and firm performance'. *Industrial Marketing Management*, **31**, 515–24.

Clegg, S., Hardy, C. and Nord, W. R. (1996). *Handbook of Organization Studies*. London: Sage.

Crilly, D., Zollo, M., & Hansen, M. T. (2012). 'Faking it or muddling through? Understanding decoupling in response to stakeholder pressures'. *Academy of Management Journal*, **55**, 1429–48.

Davis, J. P., Eisenhardt, K. M. and Bingham, C. B. (2007). 'Developing theory through simulation methods'. *Academy of Management Review*, **32**, 480–99.

Delery, J. E. and Doty, D. H. (1996). 'Modes of theorizing in strategic human resource management: Tests of universalistic, contingency, and configurational performance predictions'. *Academy of Management Journal*, **39**, 802–35.

Doty, D. H. and Glick, W. H. (1994). 'Typologies as a unique form of theory building: Toward improved understanding and modeling'. *Academy of Management Review*, **19**, 230–51.

Fiss, P. C. (2007). 'A set-theoretic approach to organizational configurations'. *Academy of Management Review*, **32**, 1180–98.

Fiss, P. C. (2011). 'Building better causal theories: A fuzzy set approach to typologies in organization research'. *Academy of Management Journal*, **54**, pp. 393–420.

Fiss, P., Sharapov, D. and Cronqvist, L. (2013). 'Opposites attract? Opportunities and challenges for integrating large-N QCA and econometric analysis'. *Political Research Quarterly*, **66**, 191–97.

Fornell, C. and Larcker, D. F. (1981). 'Evaluating structural equation models with unobservable variables and measurement error'. *Journal of Marketing Research*, **18**, 39–50.

Fricker, S., Galesic, M., Tourangeau, R. and Ting, Y. (2005). 'An experimental comparison of web and telephone surveys'. *Public Opinion Quarterly*, **69**, 370–92.

Ganter, A. and Hecker, A. (2013). ‚Configurational paths to organizational innovation: qualitative comparative analyses of antecedents and contingencies'. *Journal of Business Research,* forthcoming.

Gulati, R., Nohria, N. and Zaheer, A. (2000). 'Strategic networks'. *Strategic Management*

Journal, **21**, 203–15.
Grandori, A. and Furnari, S. (2008). 'A chemistry of organization: Combinatory analysis and design'. *Organization Studies*, **29**, 459–85.
Greckhamer, T. (2011). 'Cross-cultural differences in compensation level and inequality across occupations: A set-theoretic analysis'. *Organization Studies*, **32**, 85–115.
Greckhamer, T., Misangyi, V. F., Elms, H. and Lacey, R. (2008). 'Using qualitative comparative analysis in strategic management research'. *Organizational Research Methods*, **11**, 695–726.
Grewal, R. and Tansuhaj, P. (2001). 'Building organizational capabilities for managing economic crisis: The role of market orientation and strategic flexibility'. *Journal of Marketing*, **65,** 67-80.
Häge, F. M. (2007). 'Constructivism, fuzzy set and (very) small-N: Revisiting the conditions for communicative action'. *Journal of Business Research*, **60**, 512–21.
Hult, G. T. M., Ketchen, D. J., Cavusgil, T. S. and Calantone, R. J. (2006). 'Knowledge as a strategic resource in supply chains'. *Journal of Operations Management*, **24**, 458–75.
Jaworski, B. J. and Kohli, A. K. (1993). 'Market orientation: Antecedents and consequences'. *Journal of Marketing*, **57**, 53–70.
Katz, D. and Kahn, R. L. (1978). *The Social Psychology of Organizations*. 2nd edition, New York: Wiley.
Kent, R. A. (2005). 'Cases as configurations: Using combinatorial and fuzzy logic to analyse marketing data'. *International Journal of Market Research*, **47**, 205–28.
Kent, R. A. and Argouslidis, P. C. (2005). 'Shaping business decisions using fuzzy-set analysis: Service elimination decisions'. *Journal of Marketing Management*, **21**, 641–58.
King, A. W. (2007). 'Disentangling intrafirm and interfirm causal ambiguity'. *Academy of Management Review*, **32**, 156–78.
Kitchener, M., Beynon, M. and Harrington, C. (2002). 'Qualitative comparative analysis and public services research'. *Public Management Review*, **4**, 485–504.
Kogut, B., MacDuffie, J. P. and Ragin, C. C. (2004). 'Prototypes and strategy: Assigning causal credit using fuzzy sets'. *European Management Review*, **1**, 114–31.
Kvist, J. (2007). 'Fuzzy set ideal type analysis'. *Journal of Business Research*, **60**, 474–81.
Leischnig, A., Geigenmueller, A. and Lohmann, S. (2013). 'On the role of alliance management capability, organizational compatibility, and interaction quality in interorganizational technology transfer'. *Journal of Business Research*, forthcoming.
Mahoney, J. and Goertz, G. (2006). 'A tale of two cultures: Contrasting qualitative and quantitative research'. *Political Analysis*, **14**, 227–49.
Malhotra, N. K., Kim, S. S. and Patil, A. (2006). 'Common method variance in IS research: A comparison of alternative approaches and a reanalysis of past research'. *Management Science*, **52**, 1865–83.
Marlin, D., Ketchen, D. J. and Lamont, B. (2007). 'Equifinality and the strategic group-performance relationship'. *Journal of Managerial Issues*, **19**, 208–32.
Meuer, J. (2013). 'Archetypes of Inter-firm Relations in the Implementation of Management Innovation: A Set-theoretic Study in China's Biopharmaceutical Industry'. *Organization Studies*, forthcoming.
Meyer, A. D., Tsui, A. S. and Hinings, C. R. (1993). 'Configurational approaches to organizational analysis'. *Academy of Management Journal*, **36**, 1175–95.
Morgan, R. M. and Hunt, S. D. (1994). 'The commitment-trust theory of relationship marketing'. *Journal of Marketing*, **58**, 20–38.
Narver, J. C. and Slater, S. F. (1990). 'The effect of a market orientation on business profitability'. *Journal of Marketing*, **54**, 20–35.

Narver, J. C., Slater, S. F. and MacLachlan, D. L. (2004). ‘Responsive and proactive market orientation and new-product success’. *Journal of Product Innovation Management*, **21**, 334–47.
Nunnally, J. C. (1978). *Psychometric Theory*. New York: McGraw-Hill.
Ordanini, A. and Maglio, P. P. (2009). ‘Market orientation, internal process, and external network: A qualitative comparative analysis of key decisional alternatives in the new service development’. *Decision Sciences*, **40**, 601–25.
Öz, Ö. (2004). ‘Using Boolean- and fuzzy-logic-based methods to analyze multiple case study evidence in management research’. *Journal of Management Inquiry*, **13**, 166–79.
Pajunen, K. (2008). ‘Institutions and inflows of foreign direct investment: A fuzzy-set analysis’. *Journal of International Business Studies*, **39**, 652–69.
Palmatier, R. W., Scheer, L. K., Evans, K. R. and Arnold, T. J. (2008). ‘Achieving relationship marketing effectiveness in business-to-business exchanges’. *Journal of the Academy of Marketing Science,* **36**, 174–90.
Payne, G. T. (2006). ‘Examining configurations and firm performance in a suboptimal equifinality context’. *Organization Science*, **17**, 756–70.
Podsakoff, P. M. and Organ, D. W. (1986). ‘Self-reports in organizational research: Problems and prospects’. *Journal of Management*, **12**, 531–44.
Ragin, C. C. (1987). *The Comparative Method: Moving Beyond Qualitative and Quantitative Strategies*. Berkeley: University of California Press.
Ragin, C. C. (2000). *Fuzzy Set Social Scien*ce. Chicago: University of Chicago Press.
Ragin, C. C. (2008a). *Redesigning Social Inquiry: Fuzzy Sets and Beyond.* Chicago: University of Chicago Press.
Ragin, C. C. (2008b). *Users Guide to Fuzzy-Set / Qualitative Comparative Analysis*. Working Paper, University of Arizona, Arizona.
Ragin C. C., Drass, K. A., and Davey, S. (2007). *Fuzzy set/qualitative comparative analysis*. www.fsqca.com.
Ragin, C. C. and Fiss, P. C. (2008). ‘Net effects analysis versus configurational analysis: An empirical demonstration’, in Ragin, C. C. (Ed), *Redesigning Social Inquiry: Fuzzy Sets and Beyond*. Chicago: University of Chicago Press.
Rihoux, B. (2006). ‘Qualitative comparative analysis (QCA) and related systematic comparative methods’. *International Sociology*, **21**, 679–706.
Schneider, M. R., Schulze-Bentrop, C. and Paunescu, M. (2010). ‘Mapping the institutional capital of high-tech firms: A fuzzy-set analysis of capitalist variety and export performance’. *Journal of International Business Studies*, **41**, 246–66.
Short, J. C., Payne, G. T. and Ketchen, D. J. (2008). ‘Research on organizational configurations: Past accomplishments and future challenges’. *Journal of Management*, **34**, 1053–79.
Skaaning, S.-E. (2007). ‘Explaining post-communist respect for civil liberty: A multi-methods test’. *Journal of Business Research*, **60**, 493–500.
Venkatraman, N. (1989). ‘Strategic orientation of business enterprises: The construct, dimensionality, and measurement’. *Management Science,* **35**, 942–62.
Vis, B., Woldendorp, J. and Keman, H. (2007). ‘Do miracles exist? Analyzing economic performance comparatively’. *Journal of Business Research*, **60**, 531–38.
Wagemann, C. and Schneider, C. Q. (2010). ‘Qualitative comparative analysis (QCA) and fuzzy-sets: Agenda for a research approach and a data analysis technique’. *Comparative Sociology*, **9**, 376–96.
Walter, A., Auer, M. and Ritter, T. (2006). ‘The impact of network capabilities and entrepreneurial orientation on university spin-off performance’. *Journal of Business Venturing*, **21**, 541–67.

Woodside, A. G., Hsu, S.-Y. and Marshall, R. (2011). 'General theory of cultures' consequences on international tourism behavior'. *Journal of Business Research*, **64**, 785–99.

Woodside, A. G., Ko, E. and Huan, T.-C. (2012). 'The new logic in building isomorphic theory of management decision realities'. *Management Decision*, **50**, 765–77.